

**2018 Rail Conference**

# **Heavy Rail Vehicle Procurement Orange Line and Red Line**

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## Project Summary

- Carbuilder – CRRC MA, formerly CNR
  - 152 Orange Line Cars
  - 252 Red Line Cars
- Orange Line Expected Revenue Service – Fall 2018
- Red Line Expected Revenue Service – Fall 2019



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MBTA Heavy Rail Vehicle Procurement

## Orange Line Pilot Cars



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## Project Goals

- Replace Orange Line #12 Fleet and Red Line #1 and #2 Fleets
  - #12 Fleet – 1979 – 1981
  - #1 Fleet – 1969 – 1970
  - #2 Fleet - 1988
- Subsequent Contract Amendment added 120 Red Line Cars to replace the #3 Fleet
  - #3 Fleet – 1993 - 1994

# Project Justification

- Orange Line Fleet
  - End of expected service life
    - Necessary Carbody Repairs
  - No mid-life Overhaul
- Red Line Fleets
  - #1 – Beyond expected Service Life
  - #2 – End of expected service life
  - #3 – Standardization of Fleet and cost/benefit “New vs. Overhaul”



# Specification Development

- Concept Report
- Specification Development
- Reviews at each phase
  - Stake Holder
  - Industry Review



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## Design Highlights

- Accessibility
  - 4 Accessible Locations
  - Wider Doors (64 in, each leaf 32 in)
  - Gap Mitigation Device
  - Audio (PA), Visual (LED) and PEI (6 locations)
- Functionality
  - ASME RT-2 2014 Compliance
  - Remote Diagnostics
  - LED Lighting (APTA-RT-S-VIM-020-10)
  - LLEPM (APTA-RT-S-VIM-022-10)
  - CCTV / Video Recording
  - LCD Monitors (6/8)



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## Evaluation Process

- Sequestered Evaluation Team
- All affected MBTA Departments Represented
- Consultant Support
  - Procurement Management Team
  - Technical Consultant
  - Financial Capability Consultant
  - Technical Peer Consultants





## Design Process

- Collaborative Design Process
  - PDR
  - IDR
  - FDR
- Local and Remote Meetings
- Informal (Interim) Parallel Reviews
- Active Involvement of Stakeholders
  - Team Oriented Approach



# APTA Standards



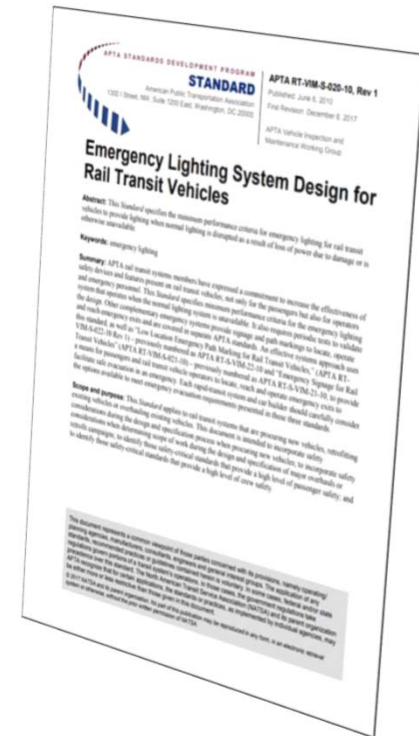
- 18 Different APTA Standards & Recommended Practices (RPs) were cited in the procurement
  - 2 Electrical Standards, 5 Electrical RPs
  - 4 Rail Transit Systems Standards
  - 5 Construction & Structural Standards
  - 2 Mechanical Standards
  - 1 Passenger Systems Standard



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# Standards In Action

- *APTA's Rail Transit Emergency Systems Standard Suite*
- 4 standards (now 5) that describe industry-consensus requirements for various aspects of Rail Transit Vehicle Emergency Systems
- Subjects covered include Emergency Lighting, Emergency Signage, Low-Location Emergency Path Markings, and Emergency Egress/Access



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# Orange Line Mock-Up



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## Laser Welded Skin

- Aesthetically Pleasing
- Stainless Steel (PR-CS-S-004-98)
- Collaborative Structural Review with CRRC and their consultants



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# ASME RT-2 Compliance

- Minimum strength requirements for coupler pockets, collision & corner posts, and buff load
- Now requires the builder understand how the trainset behaves through two specific collision scenarios. The areas of interest for the scenarios are vehicle deceleration rate, operator & passenger space, and remaining on the rail.
- Requires a minimum series of tests be performed to validate the vehicles strength.



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# ASME RT-2 Compliance



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## ASME RT-2 Compliance

Boston\_6\_6\_crashmodel\_newmodel\_AW0\_20170703\_v01

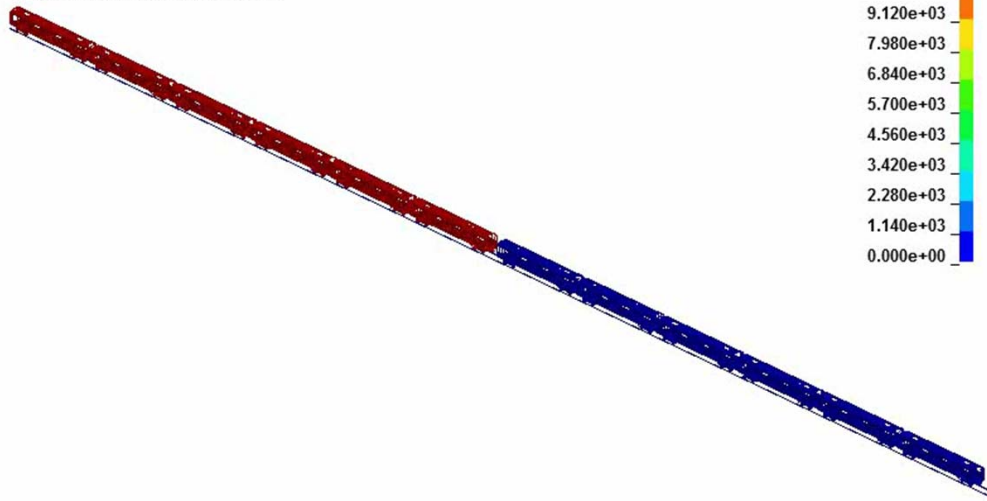
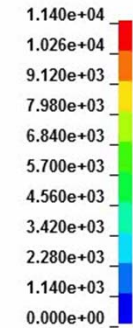
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Contours of X-velocity

min=0, at node# 30817901

max=11410.4, at node# 25074332

Fringe Levels



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## Red Line Mock-Up



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# Passenger Information Screens

- Screen size, quantity and locations revised during Orange Line Mock-Up review
- 24" LCD Monitors
- 6 / 8 screens on the Orange and Red Line cars
- On-Board Controller with ability to push messages from Wayside.



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## Current Status

- Orange Line
  - Four Pilot Cars in test in Boston
  - Four Pilot Cars in test in Changchun
  - Four Production Cars in Final Assembly in Springfield, MA (December 2018 delivery)
- Red Line
  - Mock-Up constructed and inspected in Changchun (arrives in Boston in July)
  - Structural Test Shell Under Construction



# Final Assembly Facility

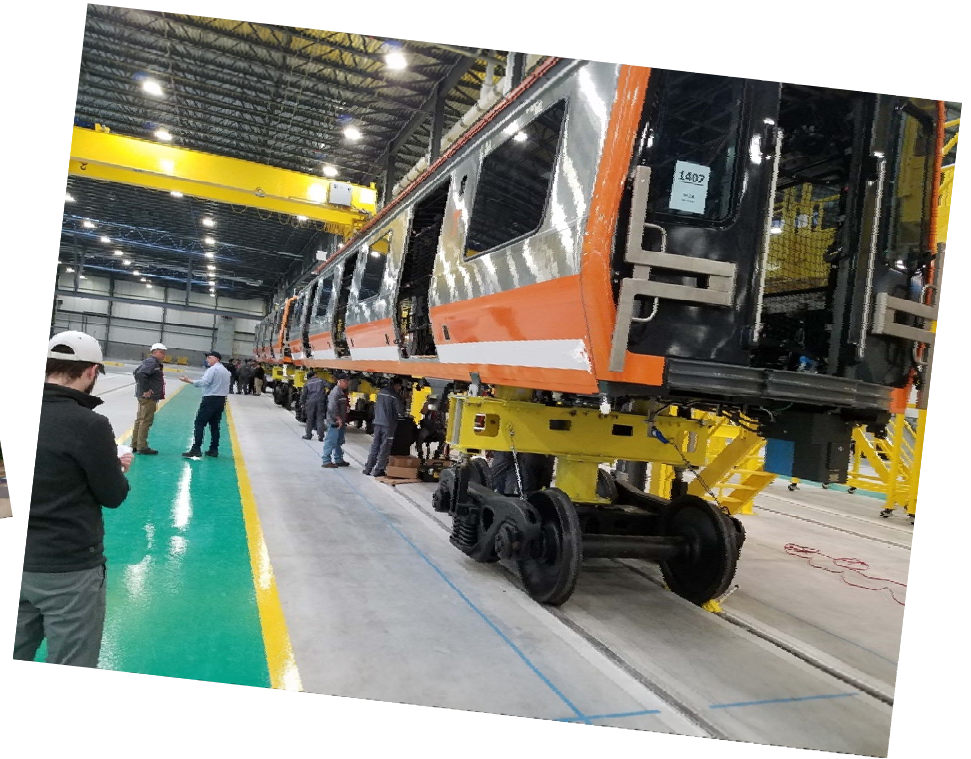
- 100% State Funding allowed a Massachusetts Final Assembly Requirement
- CRRC MA designed and constructed a 204,000 square foot facility with a 2,240 foot dynamic test track in Springfield Massachusetts.
- Currently, 86 employees at the Springfield Facility, with a goal of 150 at full occupancy
- The facility will assemble not only MBTA vehicles, but vehicles for LA METRO and SEPTA





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## Final Assembly Facility



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# Orange Line Pilot Car



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## Thank You



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